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AN APPRAISAL OF THE CUBAN SUGAR INDUSTRY

CIA/RR EP 62-21

March 1962

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CENTRAL INTELLIGENCE AGENCY

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FOREWORD

This publication presents a basic survey of the sugar industry of Cuba with particular emphasis on the period 1955-61. It is designed to provide a background to be used in making assessments of future economic activities in the sugar industry. Sources used in the publication are available in the files of this Office.

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AN APPRAISAL OF THE CUBAN SUGAR INDUSTRY\*

Summary and Conclusions

Production of raw sugar is the keystone of the Cuban economy and will continue to be so far into the future. The prospects of the Castro regime depend to a large extent on the successful functioning of the Cuban sugar industry, which now is operating primarily under government control.

Cuba devotes more than one-half of its cropland to sugarcane, produces approximately 12 percent of the annual world production of raw centrifugal\*\* sugar, and normally contributes about one-third of the total raw sugar moving in international trade. The potential exists for increases in production of cane, both by expanding the acreage of cane and by the use of more intensive techniques.

Cane is a perennial that needs to be replanted only every 8 or 9 years. It grows readily in the hospitable climate of Cuba. Pests and diseases are of only minor significance. The crucial time in the economic life of the crop is the harvest season, which lasts from January through May, the dry season of the year. At this time the cane must be cut and quickly transported to the mills for grinding. Any delay between cutting and grinding results in a decreased yield of sugar from the cane.

During both the harvest of 1961 and the current (1962) harvest the Castro regime has been forced to draft "volunteer" canecutters in order to overcome a shortage of labor in the canefields. Because of the lack

\* The estimates and conclusions in this publication represent the best judgment of this Office as of 1 March 1962.

\*\* Raw centrifugal sugar is the form of sugar produced when the sugar syrup is extracted, from either the beet or the cane, with the color and the impurities removed, the water boiled off at restrained temperatures under vacuum, crystallization induced, and sugar crystals separated by centrifugal action from the final juice. This form is to be differentiated from the product consumed in India, Pakistan, Colombia, mainland China, and Burma, which consists of the juice simply squeezed out of the cane and boiled to varying consistencies and also is to be differentiated from the pure white, completely refined sugar, which is produced from the raw centrifugal sugar with up to a 10-percent loss of weight.

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of proper technique and physical endurance required in the cutting of cane, these voluntary cutters have proved to be somewhat inefficient harvesters and occasionally have damaged the perennial root stock. In spite of both exhortation and expedients resorted to by the regime, the Cuban sugar crop in 1962 will be the smallest since 1955, according to current indications.

At the time of their expropriation by Castro, the 161 grinding mills in Cuba had capacity well in excess of requirements, but the increasing shortage of spare parts for these mills already is tending to reduce the original grinding capacity.

Since 1960, countries of the Sino-Soviet Bloc have delivered thousands of tractors, trucks, and other farm machinery to Cuba, the bulk of which has been scheduled for use in the sugar industry. Available evidence indicates, however, that much of this machinery is not well adapted to tropical conditions in Cuba and that the suppliers in the Bloc have not followed through with the necessary spare parts and maintenance facilities.

Unlike many sugar-producing countries, Cuba has been backward in developing methods and facilities for bulk handling and presently requires large quantities of jute bagging that cannot be supplied directly from indigenous Bloc sources.

In summation the Cuban sugar industry is characterized by a number of important strengths and weaknesses. On the positive side, it must be noted that the physical environment in Cuba is ideal for production of cane. Cuban sugar mills still possess grinding capacity well in excess of normal requirements for production. In the Bloc the Castro regime has found an area willing to substitute itself for the US, both as a purchaser of Cuban sugar and as a supplier of material inputs for the Cuban sugar industry. Finally, the availability to Cuba of a carry-over sugar stock of more than 1 million tons\* from 1961 will serve to mitigate substantially the adverse effects of the short crop expected in 1962.

On the negative side, disruptions introduced by the regime in the occupational structure of Cuba appear to be resulting in an increasingly severe labor shortage at sugar-harvesting time. In addition, a potential future weakness lies in the accelerating deterioration of the sugar grinding mills, which are primarily equipped with US machinery and for which replacement parts have become almost impossible for Cuba to obtain. By substituting the Bloc for the US as its primary trading partner, the

\* Tonnages are given in metric tons throughout this publication unless otherwise indicated.

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Castro regime has thrust on the Cuban sugar industry the penalties of extremely long lines of communications; significantly higher transport costs; and a long lag time between requests for and receipt of machinery, parts, and technical assistance. The countries of the Bloc are notoriously poor suppliers of spare parts and service, and Cuban authorities have discovered that Bloc agricultural machinery is poorly adapted to tropical conditions in Cuba.

As of the beginning of 1962, Cuba has no facilities for the bulk handling of sugar, nor has it developed a domestic source for production of bagging. Its very heavy requirements for bagging cannot be obtained directly from sources in the Bloc and are traditionally filled instead by India and Pakistan.

Although the Cuban position in the world sugar market in 1962 can be shored up to some extent by the availability of its large carryover stock from 1961, the net effect of a short sugar harvest in 1962 is likely to be that the already serious shortage of foreign exchange in Cuba will be further aggravated.

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## I. Introduction

In the wake of the commitment of Castro to Marxism and the Communist style of dictatorship, the economic partnership between Cuba and the US has been dissolved. Concomitant with this turn of events, the successful functioning of the Cuban sugar industry has become primarily dependent on the Sino-Soviet Bloc, both as a market for its product and also as a source of supply for capital equipment and other material inputs.

In the discussion that follows, an effort has been made to survey the relative position of Cuba in the sugar-producing world, the importance of sugar to the Cuban economy, and the biological and economic characteristics peculiar to the Cuban sugar industry. In the light of the new politico-economic orientation of Cuba, this survey also attempts a preliminary evaluation of the extent to which the Bloc has been able to take the historic place of the US in this production relationship as well as an assessment of the present status of the Cuban sugar industry.

## II. Organization

By May 1961, Castro, through the agency of the National Institute of Agrarian Reform (INRA),\* had converted the former large sugar estates into 622 cooperatives, covering an area of 1.1 million hectares\*\* and representing about 12 percent of the total area of farmland in Cuba. Of this total area, approximately 750,000 hectares are devoted to production of cane. The 622 cooperatives employ about 122,000 permanent workers and about 80,000 seasonal workers, all of whom are directly controlled by the General Administration of Cane Cooperatives (AGCC), which operates under the authority of INRA.

The owners of small farms were permitted to retain their holdings, although INRA controls to a great extent the availability of supplies and the disposition of output of this sector of the agricultural economy. The small farms cover a total area of 5.3 million hectares, or about 58 percent of the total farmland. About 750,000 hectares are devoted to production of cane, the remainder being used to produce the bulk of other Cuban agricultural crops. INRA controls the small farms through the National Association of Small Farmers (ANAP), which coordinates

\* In August 1959, all autonomous agricultural and marketing organizations were incorporated under INRA, which was endowed with independent juridical authority for handling all matters pertaining to agrarian reform, agricultural production, credit, commerce, and trade.

\*\* One hectare equals 2.471 acres.

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agricultural activities in the private sector to meet national agricultural goals. Loans are made to the small farmers through a credit department within ANAP.

The large livestock farms also were confiscated by Castro and transformed into 263 state-owned Peoples Farms. These farms cover a total area of 2.6 million hectares and comprise about 29 percent of the total farmland. The main occupation of the Peoples Farms is the raising of livestock, and these farms are of only minor significance in the sugar industry.

It is too early at this time to evaluate the effect of this government control and reorganization of the sugar industry, although there are indications that economic incentives have been diminished by the changes.

### III. Quantitative Aspects

#### A. Output

The raising of sugarcane and the extraction of raw sugar from the cane form the keystone in the Cuban economic structure. More than one-half of the total harvested area of Cuba is devoted to production of cane. Because traditionally not all of the sugarcane crop is harvested, the allocation of Cuban land resources to production of cane is even greater than a measure based only on harvested area would indicate.

Although Cuba is a small country by most standards, it accounts for about 12 percent of the annual world production of raw centrifugal sugar, including that derived from both cane and beets. The statistical relationship between the annual output of sugar in Cuba and the world total is shown in Table 1.\*

Because the population of Cuba amounts to only 7 million people, the large Cuban output of raw sugar obviously cannot be consumed domestically. Traditionally, Cuba consumes only about 5 percent of its domestic production and exports the remainder. In terms of world exports of raw sugar, the Cuban share tends to approximate one-third of the annual total, as shown in Table 2.\*\*

\* Table 1 follows on p. 7.

\*\* Table 2 follows on p. 7.

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Table 1

Production of Raw Centrifugal Sugar  
1955-61

<u>Year</u>	<u>World</u> <u>(Thousand Metric Tons)</u>	<u>Cuba</u> <u>(Thousand Metric Tons)</u>	<u>Percent</u> <u>of Total</u>
1955	38,581	4,528	11.7
1956	39,770	4,740	11.9
1957	43,868	5,672	12.9
1958	47,108	5,779	12.3
1959	49,557	5,964	12.0
1960	52,627	5,862	11.1
1961	N.A.	6,768	N.A.

Table 2

Exports of Raw Centrifugal Sugar  
1955-61

<u>Year</u>	<u>World</u> <u>(Thousand Metric Tons)</u>	<u>Cuba</u> <u>(Thousand Metric Tons)</u>	<u>Percent</u> <u>of Total</u>
1955	14,053	4,657	33.1
1956	13,918	5,440	39.1
1957	15,294	5,307	34.7
1958	15,280	5,632	36.9
1959	14,835	4,952	33.4
1960	17,565	5,634	32.1
1961	N.A.	6,413 <sup>a/</sup>	N.A.

a. Preliminary.

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B. Yields

The yield of raw sugar per harvested hectare in Cuba is low compared to yields in other cane-producing areas. From 1955 through 1960, yields of sugar averaged 5.1 tons per hectare. This yield is less than one-half of the yield obtained in Hawaii, Peru, Java, and Taiwan. The extensive nature of production of Cuban sugarcane is partly obscured by the fact that Cuba has one of the highest recovery rates of raw sugar from sugarcane. Cuba has an abundance of land to use for the growing of sugarcane and thus has low yields of cane per unit of land area. Once the cane is harvested, however, its sugar content is efficiently extracted at the mill.

International comparisons of yields of cane sugar per unit of land areas are complicated by the fact that some cane-producing areas -- for example, Hawaii and Peru -- require a growing season of up to 2 years, whereas other areas such as Louisiana require no more than 10 months. Cuba requires 12 to 14 months. Also, some regions must replant completely every year, whereas others need replant only a fraction of the total cane area.

Cuban yields per unit of land area reflect no well-defined trend in the period from 1955 through 1960, as shown in Table 3.\* No conclusions can be drawn concerning the apparently low yield in 1961, because of the fact that the estimate of harvested area for that year requires further validation.

Cuba has the potential to increase production of sugar substantially without increasing the land area devoted to cane. This increase can be accomplished by the utilization of more intensive techniques of production of cane including greater emphasis on the application of fertilizers and the wider use of irrigation.

C. Stocks

End-of-year stocks of raw sugar in Cuba averaged 970,000 tons during the period 1955 through 1960. Stocks on hand at the end of 1961 are estimated to have been somewhat above this average. The volume of end-of-year stocks in the last 3 years (1959-61) has tended toward a level almost double that of the previous 3 years (1956-58), as shown in Table 4.\*\*

\* Table 3 follows on p. 9.

\*\* Table 4 follows on p. 10.

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Table 3

Harvested Area, Production, and Yields of Raw Centrifugal Sugar in Cuba  
1955-61

Item	Unit of Measure	1955	1956	1957	1958	1959	1960	1961
Harvested area	Thousand hectares a/	835	996	1,265	1,047	1,246	1,036	1,500 b/
Production	Thousand metric tons	4,528	4,740	5,672	5,779	5,964	5,862	6,768
Yield	Metric tons per hectare	5.4	4.8	4.5	5.5	4.8	5.7	4.5 b/

a. One hectare equals 2.471 acres.

b. Estimated.

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Table 4

Production, Exports, Apparent Domestic Consumption,  
and Stocks of Raw Centrifugal Sugar in Cuba  
1955-61

	Thousand Metric Tons						
	<u>1955</u>	<u>1956</u>	<u>1957</u>	<u>1958</u>	<u>1959</u>	<u>1960</u>	<u>1961</u>
Production	4,528	4,740	5,672	5,779	5,964	5,862	6,768
Exports	4,657	5,440	5,307	5,632	4,952	5,634	6,413 <u>a/</u>
Apparent domestic consumption	300 <u>a/</u>	282	322	283	335	353	350 <u>a/</u>
End-of-year stock	1,620	638	681	545	1,222	1,097	1,102 <u>a/</u>

a. Estimated.

D. Prospects for 1962

Cuban production of raw sugar in 1962 is expected to be down considerably from the level of 1961 for a variety of reasons including drought, the reduced rate of replanting in 1959 and 1960, the fact that almost no cane was left uncut after the harvest of 1961, and the increased emphasis on production of other crops. The highest predictions approach 5.5 million tons. The exportable surplus, after allowing 350,000 tons for domestic consumption, would be a maximum of 6.2 million tons. The Sino-Soviet Bloc has agreed to take 4.9 million tons, and if Cuba fulfills its commitments to the Bloc, a surplus of 1.3 million tons will be available for export to countries outside the Bloc. Some informed Western estimates of production, however, are as low as 4.0 million tons, and a recent decision by Cuba to withhold 500,000 tons from the Bloc suggests that production might very well approach this very low level.

IV. Critical Points in the Time CycleA. Planting

Sugarcane is a perennial tropical plant, and because Cuba experiences no frost, the perennial nature of the plant can be used to advantage. Every year the perennial root stock sends up new shoots that then can be harvested. Each successive "ratooning,"\* however, yields

\* A term derived from the Spanish word retono, denoting "sprout" or "shoot."

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somewhat less sugar, and in Cuba the normal practice is to replant an area after the eighth or ninth ratoon. Accordingly, every year only about 15 percent of the total crop area is replanted to maintain a constant acreage in cane.

Before planting time the land is plowed and harrowed by tractors or oxen. Furrows are opened, and pieces of cane stalks, each with several joints, are placed in the furrows and covered. Most of the planting is done during the period September through November before the winter dry season begins. Some spring cane also is planted, however, in May or June, particularly in the eastern part of the island, if an excessively dry winter has injured the fall plantings. The government has recently announced its intention to plant more than 130,000 hectares of sugarcane in the spring of 1962. This announcement suggests either that fall plantings were injured by the drought or that the regime is determined to make up for the poor harvest in 1962 by bringing in a bumper crop in 1963.

#### B. Growing

With sufficient moisture the joints sprout, and the young cane appears above the ground about 2 months after planting. The cane must then be cultivated or hoed at least two or three times in order to kill the weeds, until the cane is tall enough to shade the ground and thereby hinder the growth of weeds.

Sugarcane in Cuba is attacked by two diseases: one, a virus disease known as mosaic, and the other a fungus disease known as ring spot. The Cubans have learned to mitigate the effects of mosaic disease by the use of resistant varieties. Ring spot (leptosphaeria sacchari) is transmitted almost entirely by spores carried about in air currents, and apparently no successful method has been devised thus far in Cuba to prevent this disease.

The only insect pest of any economic significance to the sugar crop of Cuba is the sugarcane borer (diatraea saccharalis). This pest is controlled by propagating its natural enemy, the Cuban fly (lexo-phaga diatraeae), in a laboratory and releasing these flies in infected areas.

#### C. Harvesting

The new cane is ready for harvest in 12 to 14 months. The first crop produces the highest yield and is called "plant cane." The subsequent crops from the same plantings are called "ratoons," and these produce a crop every 12 months. The harvesting takes place during the dry season from January through May, when the sugar content in the cane is

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highest and there is no rainfall to hinder harvesting operations. Harvesting starts first in the eastern part of the island and terminates in the West. The length of the harvesting season (zafra) depends on many factors, including the availability of labor, the timing of the dry season, and the amount of cane to be cut.

In the harvesting operation the tall dense cane is cut at the base of the stalk by hand with a machete. The leaves and tops are then stripped off, and the cane is cut into lengths of about 4 feet and thrown into piles. The cut cane must be taken to the mills within a few hours, or the sucrose will start inverting to glucose, which is much less desirable commercially. The cane is picked up from the pile and loaded into trailers pulled by tractors, trucks, or oxcarts and then is transported to the mills to be ground. The cane is a very bulky product, and the sugar mills are located as close to the cane-fields as possible to decrease transportation costs and the loss of time.

Once the cane is cut, it cannot be stored, and hence the harvesting period coincides with the grinding period. This fact places great strain on the Cuban labor force, about which more will be said in a succeeding section.

#### D. Processing

At the mill the cane is crushed and ground, and the juice is separated from the stalk. The sugar concentration is increased by evaporation, following which the sugar is crystallized and the crystals are removed from the liquid by centrifugation. The centrifugal raw sugar then is packed into jute bags and is ready for shipment. Although the raw sugar requires further refining, such refining is done primarily in the consuming country, largely because of the fact that refined sugar readily absorbs moisture and in transit by ocean probably would become caked. The raw sugar is not much bulkier than refined sugar, for no more than 10 percent of the weight is lost in refining.

There are now 160 sugar grinding mills in Cuba, with a combined grinding capacity of 570,000 tons of cane every 24 hours. In Cuba the recovery rate of raw sugar from cane is about 12.5 percent. At this rate the Cuban sugar mills are able to turn out 71,250 tons of sugar per 24-hour day. The maximum production theoretically possible, on the assumption of a rather long grinding season of 120 days for Cuba as a whole\* and of all mills working at full capacity, would be 8.6 million tons for one season.

\* In 1959 the national average duration of the zafra was 109 days. In 1953 it was only 94 days.

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About 650,000 tons of raw sugar are refined every year in the 21 Cuban refineries, and about one-half of this amount is consumed domestically.

V. Inputs

A. Labor

Employment in the sugar industry is highly seasonal because the harvesting of cane is essentially a manual operation that must be performed from January through May. During the harvesting season, as many as 400,000 workers have been employed in harvesting the cane and in transporting it to the mills. This number of people represents about 10 percent of the total Cuban population older than 14 years of age. The period between harvests has traditionally been one of unemployment for most of these canecutters and is termed tiempo muerto (the dead time). The Castro government has announced an intention to make more efficient use of this manpower after the harvest season by channeling the cutters into construction work and into the militia. Available evidence does not provide a clear picture as to the degree of success achieved thus far in implementing such a program. In any event the transfer of canecutters to the militia would appear to represent a further drain on the economy, unless they were conscripted for the compulsory performance of civilian work assignments.

For the current (1962) zafra, as with the last, Castro has been forced to draft "volunteer" canecutters. Many of these volunteers apparently receive no reimbursement for their efforts. Efficient harvesting of cane requires proper technique in the use of the machete, and reports indicate not only that the harvesting last year was inefficiently performed by the inexperienced "volunteers" but also that damage which might affect future harvests was not infrequently inflicted on the perennial root stock.

The cutting of cane in Cuba is almost exclusively a manual operation and, as such, is very heavy work requiring both strength and endurance. The plant grows to a height of about 12 feet, and each stalk weighs about 6 pounds. Every stalk must be cut three or four times with a heavy machete to reduce it to pieces of 3 or 4 feet in length. The initial cut must be made low on the plant to obtain a maximum length of cane. This cutting operation, coupled with the lifting and carrying, is hard on an inexperienced canecutter. In order for 400,000 cutters to harvest enough cane to produce 6 million tons of sugar during a long zafra of 120 days, every cutter must cut a ton of cane each day.

The extreme seasonality of employment in Cuba is one major factor contributing to the attractiveness of crop diversification and

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also the mechanization of the cutting process. It appears, however, that the regime does not expect within the near future to transfer cane acreage to other uses, nor has the regime as yet introduced mechanical cutters. Labor undoubtedly will continue to be a major bottleneck in the sugar industry at harvesttime, January through May.

B. Fertilizers

Arable land in Cuba is both fertile and abundant. Consequently, relatively little fertilizer is used. Most of what is used is applied to cane and tobacco land. The amount applied to cane is directly related to the market price of sugar. In recent years the total consumption of fertilizer in Cuba varied from slightly less than 200,000 tons to about 400,000 tons. Until the advent of Castro, most of this fertilizer was imported from the US, but now Cuba has turned to the Sino-Soviet Bloc for the bulk of its supplies.

The plan for 1962 calls for an application of 877,000 tons. Should Cuba be successful in obtaining this amount of fertilizer from the Bloc and in applying it more intensively to cane land, an increase in yields of cane could be expected for the harvest in 1963. When viewed against the background of the chronic shortage of fertilizers within the Bloc and the air of unreality surrounding many of the near-term Cuban economic goals, however, announcement by the regime of the planned application of fertilizer in 1962 appears overly optimistic.

C. Tractors

As of the beginning of 1962, Cuba was manufacturing no tractors, although some facilities are available for minor assembly operations. From 1954 through 1958, Cuba imported annually an average of 1,700 tractors from the US and Western Europe (primarily England and West Germany). In 1960, Cuba turned almost exclusively to the Sino-Soviet Bloc for its supply of tractors as well as for other farm machinery. During 1960 and 1961, imports from the Bloc totaled approximately 4,200 units each year. In 1962, Cuban plans envision the imports of 5,750 tractors, all of which are to be supplied by countries of the Bloc.

On the basis of data on units imported and units in circulation for each of the years 1945-58, it appears that American and European tractors, under Cuban conditions, deteriorated at the rate of approximately 5 percent per year. Now that supplies of spare parts for these tractors have been almost completely cut off, the rate of deterioration undoubtedly has increased, and as time goes by, these tractors of Western origin will continue to deteriorate at an accelerated rate. There have been persistent reports that tractors are being cannibalized. Therefore, it appears that these increased imports of tractors from the Bloc will

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not represent a net increase to the operating tractor park but will constitute, for the most part, replacements for those breaking down and falling into disrepair.

The Bloc is notorious in its failure to provide adequate service and spare parts to purchasers of its farm machinery. This inability to obtain parts and service from an area halfway around the world; the fact that Bloc tractors may be generally inferior to Western tractors; and, in particular, the fact that Bloc tractors are frequently not well adapted to the tropical conditions prevailing in Cuba are likely to result in a rate of depreciation far exceeding the historic 5 percent. Thus Cuba may be forced to continue for many years importing tractors at an annual rate higher than the prerevolution rate of 1,700 units.

Approximately one-half of the tractors in Cuba are used for agricultural purposes, and most of these are used in the sugar industry. Tractors are used to plow the soil, to cultivate the plants, and to transport the cut cane to the sugar grinding mills. On the small farms, however, these operations are still performed primarily by oxen. The shift from Western sources of supply to Bloc sources that took place in Cuba after the revolution is shown in Table 5.\*

#### D. Bagging

Most of the Cuban raw sugar is handled in jute bags holding 250 pounds each. These jute bags are imported from India and Pakistan at a rate of about 45 million per year and are used for the bagging of coffee as well as sugar. In 1958, a year of very low prices for jute, the value of imported jute bags was about current US \$12 million. These bags can be used at most only twice.

India and Pakistan produce 95 percent of the world supply of jute, and Cuba historically has depended on these two countries for its jute bagging. The Sino-Soviet Bloc cannot supply this product from indigenous production.

Under the new regime in Cuba a program has been initiated to develop utilization of the domestically cultivated kenaf plant as a substitute source of bagging fiber. A pilot fiber-processing plant has been established in Havana Province under the auspices of the Economic and Social Development Bank. In addition, the Castro government announced in 1960 that it had acquired equipment from Northern Ireland valued at current US \$2.5 million to establish a kenaf bag plant in Cuba. As projected, this plant, when completed, will have an annual production capacity of 16 million bags made from the Cuban-grown kenaf

\* Table 5 follows on p. 16.

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Table 5

Imports and Inventory of Tractors in Cuba  
1945-62

Year	Imports from		Units
	US and Europe	Sino-Soviet Bloc	Inventory of Tractors (End of Year)
1945	197	0	1,200
1946	643	0	1,900
1947	2,267	0	3,500
1948	2,145	0	5,300
1949	1,705	0	6,800
1950	2,564	0	8,500
1951	3,419	0	11,000
1952	1,835	0	12,000
1953	1,371	0	12,500
1954	1,146	0	13,000
1955	1,244	0	13,500
1956	1,396	0	14,200
1957	2,321	0	15,700 a/
1958	2,287	0	17,100 a/
1959	1,700 b/	0	17,800 a/
1960	0	4,177	20,900 a/
1961	0	4,193	23,900 a/
Planned 1962	0	5,750	28,100 a/

a. Estimated. Data for 1959 to 1962 probably are the maximum possible estimates, for the historic 5-percent rate of depreciation is used in arriving at the estimates. In fact, the rate of deterioration of the Cuban tractor park since 1959-60 almost certainly has been considerably in excess of 5 percent. As a result, the number of tractors fit for use probably is substantially (but unmeasurably) lower than the data shown for total inventory.

b. The average for 1954-58 was used and probably overstates the actual number.

fiber. An important obstacle to this program, however, lies in the fact that the regime has not been successful to date in developing an efficient technique for decorticating the home-grown fiber.

Even if the technical problems involved are solved and the kenaf bag plant reaches full capacity, Cuba will still be compelled

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to import the remaining 29 million bags required to handle the sugar and coffee crops.

In September 1961, Fausto Santos Reyes, who was in Calcutta as the leader of a Cuban purchasing mission, said that Cuba will purchase from India 50 million jute bags for sugar. In view of the fact that Cuba imports normally about 45 million jute bags from both India and Pakistan for use in packing both sugar and coffee, this figure of 50 million bags from India for sugar seems to be rather high, although the Reyes statement did not specify a time period for the purchase. Jute bagging is perhaps the most significant import in the Cuban sugar industry that cannot be supplied by Bloc sources. Although there seems to be no prospect that this supply may be cut off, imports of bagging do impose a requirement for convertible foreign exchange. The statement by Reyes might indicate that Cuba intends to stockpile this item as a hedge against future contingencies. On the other hand, increased purchases of bags might be due, at least in part, to the fact that bags used to ship sugar to the Bloc have been retained to hold the sugar in storage, and, therefore, a second use of some of the bags is presently not possible.

One way to avoid reliance on jute bags is by switching to bulk handling of the sugar, as many sugar-exporting countries have done. Cuba has been rather backward in its sugar-handling techniques, and a change to bulk handling would involve great expense and considerable time.

Presumably, Cuba will need sizable quantities of jute bagging from India and Pakistan for many years to handle its sugar crop, and, therefore, bagging will continue to be an expensive and vulnerable import in the Cuban sugar industry.

VI. Balance Sheet of Strengths and Weaknesses in the Cuban Sugar Industry

A. Strengths

The Cuban physical environment is ideal for production of cane. The rainfall is generally reliable and adequate during the growing season, after which harvesting may be conducted during a 5-month dry season. The soil is generally fertile, and there are presently no serious disease or pest problems. Production of cane in Cuba can be increased both by the use of new land and by the practice of more intensive planting.

At the time of the Castro takeover, Cuba was endowed with a high-capacity, highly efficient cane-grinding complex, with 161 sugar

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mills. These mills had a total capacity far exceeding that necessary for normal production, making possible a substantial increase in production of raw sugar, if similar increases could be achieved in the growing and harvesting sector of the industry.

Although politics appears to have played a more important role than economics, the Cuban sugar industry nevertheless has been shored up through commercial commitments made to the Castro regime by the Sino-Soviet Bloc. The Bloc has taken the place of the US as a primary purchaser of Cuban sugar. At least through 1965 the Bloc is committed to almost 5 million tons of sugar every year. In addition, the Bloc also has committed itself to substitute for the US as the primary supplier of machinery and other material inputs necessary to the operation of the Cuban sugar industry. Finally, in spite of the export of more sugar in 1961 than in any other recent year, the Cuban sugar industry was still able to maintain a carryover stock of more than 1 million tons for 1962. Inasmuch as an unusually short crop is expected in the current year, this large carryover will assume critical importance in assisting Cuba to maintain its place in the world market.

#### B. Weaknesses

Apparently as a result of disruptions introduced by the Castro regime in the occupational structure of Cuba, sugar harvesting operations are suffering increasingly from a shortage of labor. The approximately 1.5 million hectares of cane must be cut in a relatively short period of time, and the harvested cane must be transported immediately to the grinding mills to minimize the loss of sugar content. The harvesting of cane is exacting and exhausting work, and the use of uninspired and inexperienced "volunteer" cutters results in economic loss. Although Cuba can increase production of cane in the field and has the capacity to grind increased quantities of cane in the mills, any increase in production of sugar will depend on the ability of the regime to overcome the serious bottleneck of labor shortages during the harvest season.

At the time of the takeover by Castro, most of the machinery used in the Cuban sugar industry was of US manufacture. Although present capacity in the grinding mills is still well in excess of normal production requirements, the need for replacement parts in many mills is already serious and will grow with time. Failure to obtain adequate replacements may soon result in a reduction of the present grinding capacity of the sugar mills.

The fact that the new suppliers in the Sino-Soviet Bloc are located halfway around the globe from Cuba means that the delivery of machinery, parts, and other material is now a far more time-consuming

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process than before. Even if it is assumed that the countries of the Bloc are willing and able to respond quickly to Cuban requests, the simple fact of distance compels the Castro regime to suffer the penalty of a long lag time between the request for and the receipt of assistance from the Bloc. In addition, increased transportation charges, stemming from a greatly expanded volume of long-distance international shipping, represent an unavoidable added cost to the Cuban sugar industry as long as the Bloc functions as its principal market and source of resupply.

Apart from the factor of distance, the record established by the countries of the Bloc as suppliers of spare parts and service is notoriously poor, especially in the area of automotive equipment. Furthermore, unless the countries of the Bloc prove to be willing to modify their standardized lines of production to the specific Cuban requirements, much of the material and machinery from the Bloc will continue to be poorly adapted to Cuban agricultural conditions. At present the necessity for Cuban technicians to make time-consuming technical modifications leads to excessive delays in putting machinery from the Bloc into operation. Similarly, shortages of spare parts are making it difficult for the Cubans to maintain this machinery in operating condition.

Cuba is dependent on two countries outside the Bloc, India and Pakistan, for its supplies of jute bagging. The need for this material results in a drain on seriously limited foreign exchange holdings and, perhaps more significantly, constitutes an input to the Cuban sugar industry that cannot be supplied directly from sources in the Bloc.

Finally, although Cuba entered 1962 with a carryover stock of more than 1 million tons of sugar, it appears that the total amount of sugar available for export in the current year will be substantially lower than the regime had anticipated, because of a serious reduction in the harvest in 1962. The virtual certainty of a short harvest in 1962 stems from a variety of factors, including an unusual drought during the growing season, overcutting in 1961, underplanting in 1959 and 1960, and a shortage of skilled harvesting labor brought about by the disruption by the regime of the traditional occupational structure in Cuba.

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